

# Thrive Home Builders

Z.E.N. 2.0 Collection  
Denver, CO



## BUILDER PROFILE

### Thrive Home Builders

Denver, CO, [thrivehomebuilders.com](http://thrivehomebuilders.com)

Bill Rectanus

[brectanus@thrivehomebuilders.com](mailto:brectanus@thrivehomebuilders.com)

303-707-4400

**Rater:** Energy Logic, Aaryn Jackson

[aaryn.jackson@nrglogic.com](mailto:aaryn.jackson@nrglogic.com)

## FEATURED HOME/DEVELOPMENT:

### Project Data:

- Name: Z.E.N. 2.0 Collection
- Location: Denver, CO
- Layout: 5 bdrm, 4.5 bath, 2 fl + bsmt, 3,945 ft<sup>2</sup>
- Climate Zone: IECC 5B, cold
- Completion: May 2017
- Category: production

### Modeled Performance Data:

- HERS Index: without PV 38; with PV 4
- Projected Annual Energy Costs: without PV \$1,450; with PV \$-50
- Projected Annual Energy Cost Savings: (vs typical new homes) without PV \$2,350; with PV \$3,900
- Projected Annual Energy Savings: without PV 8,500 kWh, 500 therms; with PV 21,100 kWh, 500 therms
- Added Construction Cost: without PV \$13,300, with PV \$31,900
- Savings in the First 30 Years: \$190,600

Thrive Home Builders is so certain about the low energy bills its home buyers will see that each home comes with a two-year guarantee. If utility bills exceed a predicted amount, Thrive will pay the difference. The Denver-based home builder has been building and certifying highly efficient homes to the U.S. Department of Energy's Zero Energy Ready Home program since 2014 and the 41 homes that make up its ZEN 2.0 collection at the redeveloped Stapleton Airport site in northeast Denver are all net zero energy, thanks to the solar photovoltaic arrays on each home as well as a host of energy-efficiency and high-performance home features.

Like every home Thrive builds, these homes were constructed to the criteria of the DOE Zero Energy Ready Home program, which requires homes to meet all of the requirements of ENERGY STAR Certified Homes Version 3.0 or 3.1 and the U.S. Environmental Protection Agency's Indoor airPLUS program as well as the hot water distribution requirements of the EPA's WaterSense program and the insulation requirements of the 2015 International Energy Conservation Code. While homes are not required to have the photovoltaic panels installed, they are required to have the conduit, structural support, and electrical panel space in place for future installation.

Thrive has taken the extra step of installing a 7.93-kW solar photovoltaic system on this home, as well as an energy storage system. All 41 of the homes in its Z.E.N. 2.0 collection come with enough solar panels to achieve a Home Energy Rating System (HERS) score of 15 or less. This home has a calculated HERS score of 4. Even without the PV system, the energy-efficient home would achieve a HERS score of 38.

The traditional farmhouse style of the home with its simple gable roofs, front porches, and lap siding belies the sophisticated energy-efficiency technology inside. Thrive used WUFI hygrothermic modeling to come up with a wall design that would provide walls with a total insulation value of R-40 with low risk of moisture accumulation. Thrive chose double-wall construction consisting of two 2x4 24-inch on-center walls



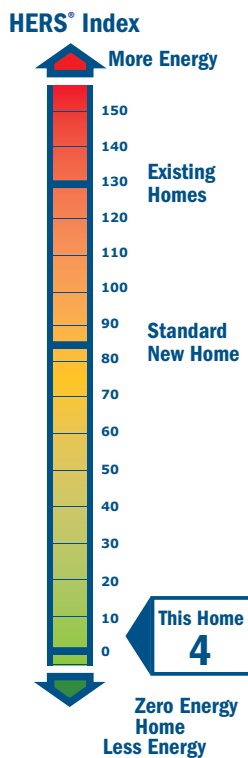
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE's Zero Energy Ready Home program. Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0/3.1 for an energy-efficient home built on a solid foundation of building science research. Advanced technologies are designed in to give you superior construction, durability, and comfort; healthy indoor air; high-performance HVAC, lighting, and appliances; and solar-ready components for low or no utility bills in a quality home that will last for generations to come.

Thrive Home Builders built this 3,945-ft<sup>2</sup> production home in Denver, Colorado, to the high performance criteria of the U.S. Department of Energy Zero Energy Ready Home (ZERH) program. Every home in the Z.E.N. 2.0 collection comes with a solar energy system to offset electricity consumption. This home was equipped with a 7.93-kW solar photovoltaic system, which is expected to bring the home's HERS scores from 38 down to 4, nearly eliminating electric bills.



### What makes a home a DOE ZERO ENERGY READY HOME?

- 1 **BASELINE**  
ENERGY STAR Certified Homes Version 3.0/3.1
- 2 **ENVELOPE**  
meets or exceeds 2012 IECC levels
- 3 **DUCT SYSTEM**  
located within the home's thermal boundary
- 4 **WATER EFFICIENCY**  
meets or exceeds the EPA WaterSense Section 3.3 specs
- 5 **LIGHTING AND APPLIANCES**  
ENERGY STAR qualified
- 6 **INDOOR AIR QUALITY**  
meets or exceeds the EPA Indoor airPLUS Verification Checklist
- 7 **RENEWABLE READY**  
meets EPA Renewable Energy-Ready Home.



with staggered studs. The walls were spaced 2.5 inches apart to provide a 9.5-inch-deep wall cavity. After installing half-inch OSB sheathing, crews sealed all seams with a sprayer-applied sealant and sprayed sealant along the top and bottom plates before attaching drywall to form airtight gaskets. Then, the wall cavities were filled with blown fiberglass. Textured house wrap provided a drainage plane behind the fiber cement and brick veneer siding.

The home's vented attic was constructed with 14-inch raised-heel trusses to allow space for the full depth of insulation over the eaves. All of the top plates were air sealed with a sprayer-applied sealant before installing the R-50 of blown fiberglass. The roof was protected with ice-and-water shield at all valleys and from the eaves up 24 inches past the wall line. The deck was covered with a synthetic water-resistant underlayment and metal drip edge was installed under the asphalt shingles.

The homes in the community have basements with concrete slab floors and 8.75-foot-tall basement walls to accommodate optional or future basement finishing. Underneath the slab is a 6-mil vapor and radon barrier that is sealed to the foundation with polyurethane sealant. Beneath the barrier is a 4-inch-thick layer of ¾-inch rock over compacted soil. As an added measure of protection, the builder installed an active radon venting system that consists of a 4-inch perforated plastic pipe installed along the inside perimeter of the foundation walls to collect soil gases under the slab. These are vented through the roof by a 4-inch stack pipe that is equipped with an inline exhaust fan. Due to expansive soil requirements, the exterior basement walls are hung from the floor joists above. These walls have a minimum 3-inch gap from the slab and are anchored to pressure-treated lumber with 6-inch nails to allow for expansion of the soil without affecting the structure. The walls are insulated with unfaced fiberglass batts providing an R-15 insulative barrier that protects the home from heat loss through the foundation.

Most of the home's heating and cooling is provided by a very efficient heat pump with an HSPF of 12.2 and a SEER of 18.9. A highly efficient 97.4 AFUE gas furnace provides back-up heat. All of the mechanical equipment is located in the conditioned basement. A MERV 15 air purifier is included in every home for enhanced air filtration. This and other measures like a continually operating energy recovery ventilator (ERV) with a MERV 6 filter, low- and no-VOC paints and finishes, VOC-absorbing drywall, and moisture-resistant construction practices to reduce the likelihood of mold formation and help maintain good indoor air quality in the home, which is certified to the U.S. Environmental Protection Agency's Indoor airPLUS criteria.





ENERGY STAR appliances and EPA WaterSense-labeled plumbing fixtures add to energy and water savings. The efficient tankless water heater provides endless hot water and is equipped with “intelligent” technology that learns the occupant’s hot water usage patterns and activates the recirculating pump during times of predicted high use to reduce wait times and water waste at the tap. All of the home’s lighting is provided by highly efficient LED bulbs.

The HVAC system’s metal supply and return ducts are located completely within the conditioned space of the home and are sealed with mastic. The ducts were tested for air tightness by a third-party energy rater as required by the DOE Zero Energy Ready Home program and showed zero leakage to the outside. The tightly air sealed home was also tested for overall air leakage and had a leakage rating of only 1.77 air changes per hour at 50 Pascals pressure difference.

Continuous hot water is supplied to the home by a .97 efficiency factor (EF) tankless gas water heater. The water heater is plumbed with a recirculation loop, which uses “intelligent” technology that recognizes usage patterns to have hot water ready for delivery during high use periods, thus reducing wait times and wasted water. Thrive equipped all of the Z.E.N. 2.0 homes with EPA WaterSense-labeled plumbing fixtures for water savings inside while outside the homes are landscaped with drought-tolerant, climate-specific plants that are irrigated with ground-level drip irrigation to minimize evaporation and reduce overall water usage.

For additional energy savings, the home is equipped with ENERGY STAR double-pane, argon-filled, vinyl-framed windows with an insulating U-factor of 0.24 and a solar heat gain coefficient (SHGC) of 0.22, meaning the windows perform well at preventing solar heat gain. ENERGY STAR appliances and 100% LED lighting add to energy savings.

Every Thrive home is provided with its own internet-based live monitoring system that tracks the home’s solar system production and overall electric consumption. “This information provides a better understanding of energy use and is a tool home owners can use to track how behavioral changes can improve the home’s overall efficiency while reducing energy costs,” said Bill Rectanus, vice president of operations for Thrive Home Builders. Rectanus also noted “Every Z.E.N. home is equipped with a Tesla Powerwall energy storage system that integrates with solar to power the home in the event of a power outage.”

Rectanus points out that, while nationwide in 2017 new homes averaged 62 on the HERS index, Thrive Home Builders’ single-family homes averaged HERS 28 and its multifamily homes averaged HERS 48. “Thrive successfully differentiates ourselves from the competition with our Zero Energy Ready construction techniques,” said Rectanus. The industry has recognized Thrive Home Builders’ efforts in housing innovation and energy efficiency. *Professional Builder Magazine* named Gene Myers of Thrive Home Builders their Builder of the Year in 2017.

## HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program  
- 100% Commitment

ENERGY STAR Certified Homes  
Version 3.1

EPA Indoor airPlus

LEED for Homes



Every DOE Zero Energy Ready Home combines a building science baseline specified by ENERGY STAR Certified Homes with advanced technologies and practices from DOE’s Building America research program.



The builder packed R-41 of blown fiberglass into the double walls, which are advanced framed to cut lumber usage.

Thrive Home Builders' consistently low HERS scores and high performance gave the builder the confidence to offer home owners a two-year built-in savings guaranty. If the total energy costs exceed the predicted amount over a 12-month period, the difference will be refunded to the home owner. "Energy bills are locked in at the original estimate, even if the cost of energy increases, college students return home, or there is an extremely hot or cold season," said Rectanus.

This confidence didn't just happen by chance. Thrive has a comprehensive in-house quality management program that includes an internal quality assurance department tasked to develop continuous improvement across all departments including construction, purchasing, architecture, warranty, and vendor-partner relations. With its trade partners, Thrive Home Builders uses highly detailed project specifications, scopes of work, a construction project management software to track costs and deadlines, checklists with numerous checkpoints embedded into the construction schedule, and an active feedback process to solicit feedback from trades. Thrive also conducts frequent training sessions including its monthly all-hands "Huddle" meetings and weekly "Building Science 101" classes covering construction details, safety, sales, etc. Thrive often brings in vendors to conduct on-site training in new technologies.

The third-party evaluations that certification programs like DOE's Zero Energy Ready Home program, ENERGY STAR, and EPA's Indoor airPLUS require are a further quality assurance check and validation of the homes' high performance.

Thrive also focuses on educating home buyers on the benefits of zero energy construction. Thrive has set up Building Science Centers at nearly every community where it builds to explain the energy-efficiency and health benefits of its homes. The builder also offers "meet your neighbor" nights giving new home owners a chance to socialize and learn more about their high-performance homes.

Thrive Home Builders also provides home owners with a one-year limited warranty that includes a 90-day and 11-month warranty review and emergency care, as needed. Customer service coordinators follow up with the home buyers at 48 hours, two weeks, 90 days, and 11 months after closing to address any issues. Thrive implemented an online punch list manager program that provides buyers with an easy way to submit their warranty requests and for Thrive to reach out to home owners with maintenance reminders.

"Home owners consistently tell us that Thrive Home Builders' energy efficiency was the primary reason for seeking out and buying a Thrive home," said Rectanus.

*Photos provided by Thrive Home Builders.*

## KEY FEATURES

- **DOE Zero Energy Ready Home Path:** Performance.
- **Walls:** Double walls, staggered studs at 24", 2.5" space between walls, 2-stud open corners, right-sized window headers, open framed wall intersections; R-40.7 total wall, closed-cell spray foam, drywall, ½" OSB sheathing, house wrap, fiber cement siding.
- **Roof:** Ice-and-water shield; waterproof underlayment; metal drip edge; 30-yr asphalt shingles.
- **Attic:** Vented attic, R-50 blown-in fiberglass.
- **Foundation:** Unfinished basement with R-15 unfaced batts.
- **Windows:** Double-pane, argon-filled, vinyl frames, U=0.24, SHGC=0.22.
- **Air Sealing:** 2.29 ACH 50.
- **Ventilation:** ERV, balanced, meets ASHRAE 62.2, MERV 6 filter on ERV, MERV 15 filter on air purifier.
- **HVAC:** Heat pump, SEER 18.9, 12.2 HSPF; 97.4% AFUE gas back-up furnace.
- **Hot Water:** Tankless gas water heater with smart recirculation pump, 0.97 EF.
- **Lighting:** 100% LED.
- **Appliances:** ENERGY STAR-rated refrigerator, dishwasher, and exhaust fans.
- **Solar:** 7.93-kW PV system.
- **Water Conservation:** WaterSense fixtures, drought-tolerant and climate-specific species, drip irrigation.
- **Energy Management System:** Battery storage.
- **Other:** Low-VOC paints, low-formaldehyde wood, active radon mitigation, 2 electric vehicle charging stations.